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BY

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THE FUNGI OF OUR COMMON NUTS AND PITS.

By Charles E. Fairman

Lyndonville, N. Y.

The mycologic flora of nuts and pits is somewhat extensive. Consequently this article is limited to a consideration of the species of fungi found on some common varieties. The species enumerated here have mostly been found in Western New York although some extralimital ones are described for the reason that they throw light upon the forms already found, or may reasonably be expected to be collected here in the future. Both saprophytic and parasitic fungi are included in this summary. Other forms of cryptogamic vegetation besides fungi thrive upon nuts. Hickory nuts are often overrun by mosses and the writer has observed upon the involucral prickles of beechnuts an alga of the genus *Oscillaria.*

The commercial value of some of the hosts is well known. Nuts are everywhere on sale either in shells or in the salted or unsalted shelled condition. In late years their use has steadily advanced as ingredients in the manufacture of ice creams, candies, pastes, jams, relishes, breads, cakes and cookies. Anything which diminishes the supply or causes deterioration in appearance or flavor has an economic importance and fungi are responsible for just those things. Serious losses from nut diseases have been inflicted upon growers. Thus, according to Crittenden (1) one Thomasville, Ga., grower sold his crop of Schley pecans which were damaged by kernel spot for 25 cents per pound when prices for good Schleys ranged from 50 to 60 cents. Spooner (2) says he has observed one season in which practically every nut in one grove was destroyed by scab before the season was half over. There is a great difference in the susceptibility of varieties to the attacks of these fungous enemies. There are also seasonal differences, for wet seasons promote the rapid growth of fungi, and yet the observer mentioned above found even in dry seasons that great fungous injury was shown by the presence of many undersized nuts.

Nuts exposed for sale have been under suspicion of spreading diseases of nut trees. J. Franklin Collins (18) found fresh chestnuts infected with *Endothia parasitica* and says it would be possible "to introduce the disease into a new locality by means of the discarded shells or kernels of the diseased nuts." This view is also supported by Miss Rumbold (17).

Saprophytic molds such as *Penicillium* and *Aspergillus,* or related hyphomycetous forms, growing upon various nut meats certainly injure the appearance and no doubt cause bitter, moldy and disagreeable flavors. For a more extended consideration of this deterioration of taste and flavor of nut meats we may well await the publication of the researches of Prof. Charles Thom, mycologist of the microbiological laboratory of the U. S. Department of Agriculture, who has collected material upon this subject in connection with the miscellaneous examination of food stuffs which come through this laboratory. In fact the condition of nuts called "bitternut" usually results from the spread of fungus mycelium through the kernels. Miss Rumbold (17) reports that nuts infected with the chestnut blight fungus are extremely bitter to the taste. From a hygienic standpoint it is best to avoid eating nuts which have a bitter taste, or are evidently moldy or subject to bacterial decomposition. Even the operation of cooking does not remove the danger of food poisoning. Pecan nuts, according to Talbot (3) have caused asthma in children and a drug manufacturing concern has put out Arlco proteins of pecan and Brazil nuts for testing the sensitiveness of patients to these anaphylactic disturbances. At first thought it might seem that fungous decay in the nuts would be responsible for these maladies, but R. P. Wodehouse, of the firm above mentioned, in answer to an inquiry by the writer reports that "nowhere do we recall ever having seen reported a case of anaphylaxis due to the products of fungi degeneration of nuts. In fact, anaphylaxis practically always is due to the native protein and the activity in this respect tends to be destroyed, rather than enhanced, by any kind of degeneration." It becomes necessary to distinguish between poisoning from sitotoxicons from nuts with fungus infection and personal idiosyncrasy or even simple gastric disturbances in any given case of supposed illness from nut eating.

As regards changes in appearance due to fungi first should be

noted alterations in size so that the nuts do not grow to standard dimensions. Premature spotting and dropping of walnuts is caused by infection with Bacterium Juglandis. Whether hickory or other nuts are subject to bacterial disease has apparently not been investigated. Nut meats are variously discolored by the growth of fungi. The shells and shucks are also much injured in color from the same cause. This discoloration may involve the whole surface of the shell or shuck or, on the other hand, occur in limited areas. Sometimes fungi are found exclusively on whitened spots. The following colors are found on affected nuts and shucks: green, black, brown, purple, crimson, red, pink, yellow or white. The various stains are, as a rule, due to the growth of special fungi. Thus a uniformly blackened surface may be due to the growth of species of *Fusicladium* or *Helminthosporium*. Purple spots are often due to *Epicoccum*. Special care should be taken by observers and collectors not to mistake accidental discolorations for those due to fungi. For instance hickory nuts are at times accidentally stained by the juice of elderberries and the resulting purple stains almost exactly resemble those produced by the growth of *Epicoccum purpurascens*. The discoloration of hickory nuts may extend clear through the shell even to the nut interior and we have traced mycelial growth almost through the nut tissues. In some instances the growth of mycelial threads upon nuts is so prolific and densely aggregated that it has received the name of "Black Crust." E. R. Spencer describes a fungus disease of Brazil nuts (4) in which the kernel is covered by a black mycelium which destroys the outer cell layers. Spencer attributes this to a fungus which has globose, hairy pycnidia, with spores 2-celled, black, conspicuously striated, measuring 21 x 13 μ and which in a personal communication he says "belongs to the Diplodia group. I am calling it *Pellionella macrospora* as it has much larger spores than any species of the genus." Black Nut of hickory nuts may be either external or internal, local or general, and may occur on hard nuts as well as those softened by decay or other causes. Sometimes it appears to be due to atmospheric or degenerative changes, and at other times to a growth of *Helminthosporium*, to the clustered pycnidia of deuteromycetes, or, as in the form called by Berkeley and Curtis *Hypoxylon nucitena*, to the subcoalescent growth of the perithecia

of pyrenomycetes. Yellow Nut of hickory nuts is also often encountered. In this disease the nuts are usually undersized, yellow in color, and with thin external walls. The inner partition walls are also much thinned and often reduced to mere papery plates. The nuts are easily crushed between the fingers. The yellow discoloration usually extends through all the nut tissues. The kernel is atrophied or absent. The cause of this disease has not been definitely ascertained. In many cases no recognizable fungus or insect depredation was found by the author on affected nuts. It probably is a disease of mixed causation, sometimes due to nutritional or developmental defects, or the so-called physiologic disease, which is but a convenient pigeonhole for ignorance, and sometimes due to the growth of fungi. In the yellowing of the kernels of horse-chestnuts the cause is clearly due to the growth of fungi of the *Penicillium* group, and in these same kernels we often find a mixed infection with other spots of yellow intermingled with white, black, or purple areas caused by the simultaneous development of other fungus species. Pecans are often discolored by the growth of *Fusicladium effusum* upon the outer surface of the shells and this disease is called Pecan Scab. Rand (5) states that pecan kernels are attacked by *Coniothyrium caryogenum* Rand which causes "dark brown, irregularly rounded surface spots with a hemisphere of pithy tissue beneath which is surrounded by a brownish layer of host cells." This disease has the name "Kernel Spot of Pecans." Bitterness of the kernel results. Even so acute an observer as Schweinitz in his description of *Dothidea Missouriensis* Schw. on pecans mistook the sterile crust for the fungus itself. His own words from Syn. Amer. bor. n. 1886 are "efformans maculas effigurates, e fusco nigronitentes plerumque longitudinaliter productas, interdum tamen latius effusas, confluentes, etc."

The growth of the mycelium of *Endothia parasitica* (Murr.) A. & A. in chestnut kernels causes a progressive change in color from a shining, bright yellow to dull light gray. Soft or crumbly nuts. This disease or condition is brought about by fungus infection and is especially observable in chestnuts.

It has excited the wonderment of several people, not trained mycologists, upon seeing a collection of nut fungi that so many different species could be found thereon, and have expressed

amazement that anything at all would grow upon such an apparently unfavorable habitat. For the benefit of those unfamiliar with the subject it may be briefly stated that cryptogams often live on many matrices where nothing would be expected to grow. We are all familiar with lichens growing upon rocks. In regard to mosses Mrs. E. G. Britton (6) says: "Mosses sometimes grow in very strange places. Once I found *Ceratodon purpureus* in a shell near the sea coast, and some of the *Splanchnaceae* will only grow upon bones or excrement of animals. Some of the oil of the nut with a little accumulated soil may have been sufficient to nourish a moss on the hickory nut, or it may have crept over it from the ground where it was growing." Prof. Roland Thaxter has found a large number of new *Laboulbeniaceae* growing on the hard chitinous parts of insects and in the case of the ascomycete *Cantharosphaeria chilensis* tells us (7) that "it is not unlikely that it may obtain its necessary materials from the film of foreign matter which covers the surface of the host." The species of nut fungi may not all be truly nucigenous, that is deriving their nourishment entirely from the nut, but may, in some instances, find suitable trophic conditions in accumulated débris on the nut surface. We may expect to find almost any of the common saprophytic fungi growing upon nuts and pits and the only reason more have not been listed is because these hosts have not been as closely observed as other hosts of more frequent occurrence, greater economic importance or easier determination. M. C. Cooke (8) tells us that "fungi should make their appearance and flourish in localities generally considered inimical to vegetable life is no less strange than true." "It may well occasion some surprise that fungi should be found growing within cavities wholly excluded from the external air, as in the hollow of filberts and the harder shelled nuts of Guilandina, etc." Miss Rumbold (17) has found inside the hard shell of the chestnut uncontaminated growths of the blight fungus and molds "especially *Penicillium* sp. had in some cases penetrated the kernel." Here the infection came through the burs and entered the nut at the base where there is a close connection between the nut and bur and where the outer shell remains soft until near the maturity of the fruit.

In regard to the place of elective growth of fungi on nuts and

pits we may say that fungi may be found at any place on the shell, or in the interior of the hosts. They are frequently found at the acute tips of hickory nuts and nowhere else on the nut. This may be, at least in many instances, accounted for from the fact that the outer shuck often is dehiscent only at the tip and when the apex of the nut is exposed in the resulting cleft fungi very readily find access and grow in a very favorable situation. Schweinitz observed this seat of fungus growth for he says of one of his species that it is found "praesertim in cacumine nucis." The comparatively smooth surface of hickory nuts and cherry stones seems a more favorable location for fungi than the rough and furrowed exterior of walnuts and peach pits. Nevertheless fungi do grow upon the latter matrices and it is not a rare occurrence to find *Caryospora putaminum* (Schw.) De Notaris growing on the external surface of peach pits, sometimes on the ridges, sometimes in the valleys or depressions between the ribs.

The relation of the histological structure of hickory nuts to the growth of fungi has not been extensively investigated. Simple inspection with a hand lens reveals three layers: first an external, thin, epidermal and protective layer often removable by the simple process of peeling; second, a middle layer, which is thickest, and third, an inner coat. Pycnidia and perithecia are often found sunk in the outer layer, extending as far as the middle layer. After removal of the fruit bodies for examination a depression is often seen evidently reaching as far as the middle coat. Microscopic details of the changes in structure in nut tissue from the growth of fungi have not been satisfactorily studied.

Insects have been suspected to cause fungus disease of nuts by carrying in the spores on their bodies. According to investigations conducted by the Georgia State Board of Entomology in 1917 the green soldier bug, *Nezera hilaris,* is a very important factor in the production of Spot disease. Turner (9) states that "we have not been able to determine absolutely whether the spot is caused by a fungus which is carried by the bug, or whether the spot is directly due to the feeding of the bug." Dr. E. P. Felt (10) states that "it would not surprise me if *Nezera hilaris* caused the Kernel Spot in pecans since I know of a related species which pierces the pods of peas and produces a shrunken affected area in the develop-

ing peas. The same species causes a somewhat similar injury to green corn and tomatoes and I would therefore think it quite possible that a bug might be responsible for the Kernel Spot."

In Western New York the mite *Oribella pilosa* Banks is found living between the shuck and nut of black walnuts and hickory nuts are frequently eaten by some insect which is probably the larva of the pecan shuckworm *Laspeyresia caryana* Fitch. The role they play in fungus development is unknown. In fact we are forced to agree with the observations of Felt, loc. cit. "an invasion by any such insect would naturally be followed by entry of smaller insects, moisture and the development of various molds and fungi. It would require a considerable series of specimens taken at various stages of development to determine the species concerned and the part each might play in the introduction of vegetable organisms." For the insects harbored by our nut trees consult the monograph by Dr. Felt. (11)

It has been a custom of mycologists to separate the genera of pyrenomycetes and some imperfecti according to their manner of growth, that is whether superficial or immersed in the tissues of the host. These differential characters do not hold good in the determination of nut fungi. Thus in a specimen of *Sphaeropsis* on hickory nuts from Upper Alton, Illinois, the pycnidia on the shuck were found to be typically subepidermal while those growing on the nut shell in lines between the dehiscence of the shuck were absolutely superficial. The same thing has been observed on nuts without shucks. Ellis and Everhart (12) have observed similar growth in the case of *Didymella fructigena* E. & E. which when it occurs on dried up cherries has the perithecia covered, but "when growing on the denuded cherry stones superficial with the base adnate." From which it follows that species of *Phoma* happening to grow on the sclerenchyma of nuts and pits are apt to be put in *Aposphaeria, Didymella* called *Melanopsamma,* while species of *Leptosphaeria* would be referred to the genus *Melanomma,* if we adhere strictly to superficial growth as a diagnostic feature. Where it is possible to have other data, such as details of the structure of stroma, perithecia, asci and spores, these should be given equal, perhaps greater weight in determining the genus of the species under examination.

In the study of nut and pit fungi each nut or pit must be separately examined by the microscope and samples taken from different locations on the same specimen for it would be misleading to consider the fungi as all the same in any given collection simply because they were apparently similar under a hand lens or low power binocular. The author's specimens have thus been gone over, nut by nut, and it has taken the leisure of almost a year and a half to examine the collection and report the results here recorded.

It redounds to the credit of American Mycology that much of the work on our nut fungi has been accomplished by native scientists. Schweinitz, the pioneer investigator of the fungi of this country, described forms which are good and noteworthy species, such as *Sphaeria putaminum, Sphaeria pericarpii, Sphaeria caryophaga* and *Arcyria globosa.* Later, Charles H. Peck, N. Y. State Botanist, added *Phoma exocarpina* and *Caryospora minor* to the list. J. B. Ellis, of Newfield, New Jersey, perhaps the greatest of American pyrenomycetologists, has given us descriptions of *Hendersonia pustulata, Aposphaeria nucicola, Pestalozzia nucicola, Teichospora nucis, Glonium caryigenum, Melanopsamma abscondita, Didymella fructigena,* and other less remarkable forms. A few scattered species are to be placed to the credit of other individuals, but to the three above mentioned belongs the honor of laying the foundation of nut and pit pathology in this country. This article, which is not to be considered a monograph, does not attempt any serious revision of genera and species, and the names in common use are generally selected.

In the following list several groups of fungi are unrepresented. No members of the *Ustilagineae* or *Uredineae* have been found by the author on nuts and pits. Among the *Basidiomyceteae* there has been twice collected on hickory nuts at Lyndonville, N. Y. a depauperate *Coprinus* which refuses to yield spores and is therefore at present not in condition for identification. In the *Gasteromyceteae* we have only to record the common bird's nest fungus *Crucibulum vulgare* found growing on oak acorns on the banks of Oak Orchard Creek near Point Breeze in Orleans County, N. Y.

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Note.—In corroboration of the view expressed in the text regarding the possible toxicity of nuts infected with *Penicillium* sp. the results of the experiments of Sturli (16) seem to prove the toxic action of mycelium and spores. Rabbits fed upon mycelium of Penicillium glaucum, grown upon Raulin's medium, or injected with alcoholic extract of the mycelium, developed convulsions, cramps and death.

List of Species.

FUNGI IMPERFECTI.

SPHAERIODACEAE.

1. **Phomopsis carposchiza** sp. nov. Pycnidia at first immersed becoming pustuliform elevated and finally suberumpent, splitting the epidermis in a laciniate manner, surrounded by an elevated border, often lying singly or in groups at the bottom of depressions between the laciniae, black, sometimes shining at the apex; spores fusoid, 2-guttulate, hyaline, 6–8 x 1.5–2 μ; sporophores long filiform, hamate, hyaline, 17–24μ in length. On the exterior surface of horsechestnuts, Lyndonville, N. Y., C. E. Fairman. This form has been observed for many years at the above mentioned locality. It comes near to *Phomopsis carpogena* (Sacc. and Roum.) Diedicke from which it differs in gross appearance and manner of erupting, and probably has a connection with a different *Diaporthe*.

2. **Phoma exocarpina** Peck, 46th Rep. p. 38. On pericarp of *Carya porcina,* Michigan, G. H. Hicks. What appears to be the same thing was found at Lyndonville on the inner surface of nut shuck of some species of *Hicoria,* May 1, 1919, C. E. Fairman, with spores 6–10 x 3–3.33 μ borne on long slender sporophores. Also on nuts of *Hicoria,* Albion, N. Y. May, 1919, Miss Lucy Porter, Dr. L. B. Wright and Miss Clara Gray. On nut of *Hicoria,* South Hill, Ithaca, N. Y., Aug., 1918, George Hume Smith. Plate 15, fig. 6.

3. **Macrophoma Fitzpatriciana** sp. nov. Pycnidia gregarious or scattered, immersed becoming erumpent-superficial, globose, black, 400–500 μ in diameter: spores numerous, fusoid, attenuated at the ends, straight or curved, hyaline, 14–20 x 3–4 μ, apparently borne on filiform, fasciculate sporophores. On hickory nuts, Forest Home, Ithaca, N. Y., Harry M. Fitzpatrick. Distinguished readily from *Rhabdospora baculum* by its fusoid spores and immersed pycnidia. Plate 15, fig. 4.

4. **Aposphaeria allantella** Sacc. and Roum. Reliq. Lib. Ser. IV., n. 83. Sacc. Sylloge, III., 171. Our specimens have the following characteristics: pycnidia scattered or gregarious, superficial, globose, black, 150–250 μ in diameter; spores allantoid, straight or curved, hyaline. In the original description the sporophores are said to be inconspicuous, but the specimens herein listed often afford long, filiform basidia. On hickory nuts, Lyndonville, N. Y., May, 1919, Fairman, Wright & Gray. Plate 15, fig. 2.

5. **Aposphaeria nucicola** Ell. et Everh. Bull. Torr. Bot. Cl. 1897, p. 287. Sacc. Sylloge Fungorum, 14: 894. On hickory nuts, Newfield, N. J., Ellis and Lyndonville, N. Y., Fairman. Also on cherry pits, Lyndonville, N. Y., July, 1920, Fairman. Plate 15, fig. 1, drawn from original specimen in Ellis Collection.

6. **Rhabdospora baculum** Grove, Kew Bull. Misc. Inf. No. 4, 1919, p. 195. Syn. *Phoma baculum* Sacc.; *Sphaeropsis baculum* Ger.; *Macrophoma baculum* Berl. & Vogl. Pycnidia scattered or gregarious, globose or globose-depressed, 250–500 μ in diam., black; spores oblong cylindric, rounded at the ends, granular, or occasionally minutely guttulate, hyaline, usually measuring 13–17.5 x 2.5–4 μ, frequently reaching 27 μ in length; sporophores short, hyaline often inconspicuous or absent.

On outer surface of hickory nuts, and sometimes on the inner partition walls of cracked nuts, Lyndonville, N. Y., and Ridgeway, N. Y., May, 1919, Fairman. On acorns of some species of *Quercus,* Banks of the Oak Orchard Creek, near Point Breeze, Orleans County, N. Y., Aug. 1, 1920, Miss Clara Gray. On old pericarp of horsechestnut, Lyndonville, N. Y., Aug. 1920, C. E. Fairman. The last has spores 17 x 2.5 μ. Plate 15, fig. 3.

7. **Rhabdospora baculum nucimaculans** var. nov. Pycnidia scattered or gregarious, immersed becoming superficial, with a more or less adnate base, globose, obtusely ostiolate, dull black, shining at the apex, 100–200 μ in diam.; spores numerous, oblong or cylindric, rounded at the ends, simple and continuous, hyaline, 6.66–11 x 1.5–2.5 μ, borne on long slender sporophores which, however, are often absent. On hickory nuts, Lyndonville, N. Y., May, 1919 and 1920, Fairman. On cherry-pits, Lyndonville, N. Y., May, 1919 and 1920, Fairman. The cherry-pit specimens measure 5–11 x 2–3 p. The plant is smaller throughout, but since the spores are precisely the same in form we are calling it merely a small spored variety. Plate 15, fig. 5.

8. **Vermicularia Dematium** (Pers.) Fr. Pycnidia scattered, immersed, then becoming erumpent, globose-depressed, crowned with bristles, black, minute; pycnidial bristles acute at tips, bulbous and connected at the base, brown, 70–165 x 6–7 μ; spores fusoid, crescentic, rarely straight, often multiguttulate, hyaline, 17–24 x 3.5–4 μ. The above description applies to a quite common *Vermicularia* on nuts and pits which we can not distinguish from what is common on herbaceous stems and goes by the name *V. Dematium.* On hickory nuts, Waterport, N. Y., Dr. R. W. Bamber, June 1, 1919. On hickory nuts, Lyndonville, N. Y., Fairman. What appears to be the same thing was collected on hickory nuts at Orient, Long Island, N. Y., by Roy Latham in 1919. Mr. Latham's specimens have setae 120–250 μ in heigth, and fusoid, curved spores measuring 20–27 x 2.5–3 μ. In all the specimens examined a tuft of long, rigid setae is all that can be seen projecting above the surface of the nut. Plate 15, fig. 10.

9. **Vermicularia exocarpinella** sp. nov. Pycnidia gregarious, immersed then erumpent, globose or globose-depressed, surrounded by brown or black, simple, non-septate, acute tipped bristles

of great variability in length, ranging from 50–250 μ x 4–7 μ black, 150 μ and upward in diam.; spores straight, incurved at the tips, hyaline or greenish hyaline, fusoid, endochrome often pseudoseptate at the middle of the spore, 20–23 x 3–4 μ.

On shucks of hickory nuts, Letchworth Park, N. Y., July 11, 1920. Miss Clara A. Gray.

10. **Vermicularia putaminicrustans** sp. nov. Pit-incrusting *Vermicularia*. Pycnidia numerous, gregarious, forming or imbedded in a black, felted crust, globose, surrounded by straight, rigid, black bristles, 60–200 μ in length and 4–6 μ in breadth, bulbous dilated at base, tapering gradually upward to a subacute tip, black, 125–150 μ in diam.; spores fusoid, subcrescentic, 24–30 x 3.5–4 μ, hyaline. On cherry pits on the ground under cherry trees, Oak Orchard on the Ridge, Orleans County, N. Y., and Lyndonville, N. Y., July 1920, C. E. Fairman.

Easily recognized from the black crust which covers the pits.

11. **Pyrenochaeta nucinata** sp. nov. Pycnidia cespitose, occasionally subcoalescent, at times scattered, erumpent-superficial, globose, centrally ostiolate, surrounded by bristles, black, 175–300 μ in diam.; pycnidial bristles numerous, straight or curved, rigid, subobtuse at the tips, not usually septate, 40–150 μ in height and 6–7 μ broad at the base; sporophores numerous, somewhat stout, simple or branched, 17–50 x 1.5 μ; spores many, oblong or cylindric, rounded at the ends, simple, continuous, hyaline, about 10–12 x 1.5 μ. Plate 15, fig. 7a and 7b.

On a hickory nut, Lyndonville, N. Y., Oct. 13, 1919, Miss Clara Gray.

12. **Dothiorella nucis** sp. nov. Stromata scattered or gregarious, immersed becoming erumpent-superficial, rounded, oblong or irregularly confluent, more or less elevated, with irregular ridges and depressions here and there, with one to four or more shining black ostiola, black, 250–1250 μ in diam.; loculi one to several, globose, angular, or of variable form, the intervening walls generally broken down, causing a series of communicating chambers or an open, central, cavity, lined with a light colored or greenish hyaline to sordid layer of simple or branching, moderately long, filiform sporophores; spores oblong cylindric, continuous, granular or with 1-2 small guttulae, hyaline, 13.3–17 x 3.3 μ, borne on the

sporophoric layer. On the outer blackened surface of hickory nuts, Lyndonville, N. Y., May, 1919, C. E. Fairman. Plate 15, fig. 9. Quite different from *Dothiorella Hicoriae* Dearness and House which has spores 15–18 x 10–12 μ.

13. **Sphaeropsis pericarpii** (Schw.) E. & E. Syn. *Sphaeria pericarpii* Schw., N. Am. 1590; *Sphaeropsis pericarpii* Peck, 25th Rep. p. 85; *Sphaeropsis Caryae* C. & E., Grev. V, p. 52; *Sphaeria involucri* Schw., in Herb. Schweinitz; *Sphaeropsis pericarpii* (Schw.) E. & E., Proc. Acad. Nat. Sc. Phil. 1895. On hickory nuts, Bethlehem, Pa., Schweinitz; N. Y. State, Peck; New Jersey, Ellis; Upper Alton, Illinois, Miss Alice Fairman; Lyndonville, N. Y., Charles E. Fairman. The spores will average 20–25 x 10–12 μ. Plate 15, fig. 8.

14. **Sphaeropsis pallidula** sp. nov. Pycnidia scattered, gregarious or coalescent, globose or ovate-globose, subsuperficial, base adnate and slightly sunk in the matrix, with minute, slightly protruding ostiola, perforate at times, pale brown, lighter toward the apex, about 200 to 250 μ in diam.; sporophores stout, long branching, hyaline: spores ellipsoid, sigmoid or inequilateral, pale brown to reddish brown, hyaline at the ends, 14–27 x 6–7 μ.

On a hickory nut, Lyndonville, N. Y., May 3, 1919, C. E. Fairman. This appears to be a connecting form between the *Sphaeropsideae* and *Zythiaceae*. The light color, soft, waxy structure, and poorly developed pycnidial cells suggest the latter. Plate 16, fig. 6.

15. **Coniothyrium caryogenum** Rand, Journal of Agricultural Research, Vol. I, p. 334, 1914. Pycnidia roundish, ostiolate, thin walled, dark brown, about 200 to 250 μ in diameter; sporophores short or not distinct; spores pale brownish, ellipsoid, 1-celled, 2.5–3.6 by 1.8 to 2 μ. On kernels of *Carya illinoiensis* (Wang.) K. Koch from the pecan belt in Georgia, North Carolina, Florida, Louisiana and Texas.

16. **Haplosporella Aesculi** (Faut. & Roum.) comb. nov. Syn. *Sphaeropsis Aesculi* Faut. & Roum. Rev. Mycol. 1892, p. 113 and Saccardo, Syll. Fung. XI, p. 512. Pycnidia single or pluriloculer, at first immersed then becoming erumpent, surrounded by laciniate fragments of the pericarp, black, variable in dimensions; spores rounded or ellipsoid, at first hyaline, then brown, continu-

ous, often granular or guttulate, 15–30 x 10–14 μ, borne on stout, thick, hyaline basidia. Frequently found on old pericarps of horse-chestnut, Lyndonville, N. Y., C. E. Fairman. The spores exceed the dimensions of *Sphaeropsis pericarpii* (Schw.) and seem indistinguishable from the *S. Aesculi* found by Fautrey and Roumeguere on the bark of *Aesculus.*

17. **Diplodina epicarya** sp. nov. Pycnidia mostly gregarious and clustered, rarely scattered, immersed, becoming erumpent superficial, globose, opening by a central pore, often collapsing with age, dull black, 200–300 μ in diameter; spores numerous, ellipsoid, obtusely rounded at the ends, continuous at first becoming 1-septate, not constricted at the septum, hyaline or subhyaline, 6–10 x 2–3 μ, borne on long hyaline sporophores, about 20–23 μ in length. Plate 15, fig. 11. On hickory nuts, Lyndonville, N. Y., Apr. and May, 1919, C. E. Fairman, and Oct. by Miss Clara Gray. On nuts of Black Walnut, Lyndonville, N. Y., 1919, Fairman. The pycnidia are Phoma-like in structure, and we have followed Diedicke in Ann. Mycol. 10: 143 in the generic reference.

18. **Stagonospora nuciseda** sp. nov. Pycnidia gregarious or scattered, immersed at first finally becoming erumpent through the slightly raised and lacerated epidermal layer of the nuts, or subsuperficial, globose or ovate-globose, centrally ostiolate, black, 130–250 μ in diam.; spores numerous, oblong cylindric, subattenuate and rounded at the ends, 1–3-septate, slightly or not at all constricted at the septa, hyaline to subhyaline, yellowish when massed, 17–20 x 3–4 p; basidia inconspicuous. On hickory nuts lying on the ground, Lyndonville, N. Y., Apr. 1919. On the smooth, flat, inner surface of a Black walnut, Lyndonville, N. Y., May, 1919. C. E. Fairman. Plate 15, fig. 12. Rarely the spores are acute at the ends.

19. **Stagonospora nucicidia** sp. nov. Pycnidia scattered, globose, erumpent-superficial, black, minute; spores straight cylindric, obtuse at the ends, 4-locular, end cells conoid, middle cells short cylindric, external cell wall colorless or inconspicuous, 3-septate, not constricted at the septa, hyaline, 17–20 x 3–3.5 μ. Plate 17, fig. 12. On hickory nut, Lyndonville, N. Y., 1919, C. E. Fairman.

20. **Hendersonia pustulata** E. & E. New Fungi in Proc.

Acad. Nat. Science, Phil. 1893. On old hickory nuts lying on the ground, Newfield, N. J., Ellis, May 17, 1893. On hickory nuts on the ground, Lyndonville, N. Y., Apr. and May, 1919, C. E. Fairman. Plate 16, fig. 1. The specimen in the Ellis collection at the New York Botanical Garden is on the inner partition walls of half a hickory nut (sometimes on the inner surface of the shell), and occurs singly or clustered, raising the epidermis in a pustuliform manner, the pustules being flattened and cracked on the top. The author found abundant specimens at Lyndonville, on the exterior surface of the nuts and there is an absence of the pustules noted by Ellis. Hence the specific name *pustulata* is misleading.

21. **Diplodia** sp. Pycnidia scattered or gregarious, erumpent-superficial, black, about 200 p in diameter; spores ellipsoid, hyaline and continuous at first, becoming brown and uniseptate, constricted at the septum only now and then, 17–24 x 10–14 μ. On hickory nuts and shucks, Lyndonville, N. Y. and Ridgeway, N. Y. May, 1919, C. E. Fairman. On hickory nuts Albion, N. Y., 1919. Miss Lucy Porter. Specimens of *Sphaeropsis pericarpii* (Schw.) often afford a few spores which have become uniseptate. In the specimens above listed the 1-septate spores are more numerous than usual and we are calling them *Diplodia,* but whether related to any of the Diplodias described on hickory trees cannot, in the absence of cultures and inoculations, be stated. If, as seems probable, they represent a more advanced stage of Sphaeropsis common on hickory nuts that species should be called *Diplodia pericarpii* (Schw.). We do not think it possible or wise to give, at present, a specific name to this *Diplodia.* Cfr. Grove, Mycological Notes, Journ. Bot. 57: 206–210 on the stages through which *Diplodia* spores pass.

LEPTOSTROMATACEAE.

22. **Discosia artocreas** (Tode) Fr. Syn. *Discosia faginea* Lib. On hickory nuts, Lyndonville, N. Y., April and May, 1919, Fairman. On hickory nut shuck, Ithaca, N. Y., 1919. On beechnuts, Lyndonville, N. Y., June, 1920. Plate 16, fig. 2.

23. **Dinemasporium hispidulum** (Schrad.) Sacc. On hickory nuts, Lyndonville, N. Y., May 13, 1920. Fairman.

24. **Dinemasporium Robiniae** Ger. Syn. *Dinemasporium*

acerinum Peck. What appears to belong here was collected at Lyndonville, N. Y., May, 1919, by Fairman, Wright and Gray on the inner walls of a squirrel gnawed hickory nut and has pycnidial setae 85 x 3–4 μ. The spores measure 4–7 x 0.5–1 μ.

MELANCONIACEAE.

25. **Pestalozzia nucicola E. & E.** Acervuli immersed, becoming erumpent and finally rupturing, minute, 150–250 μ in diam.; spores oblong fusoid, 4–septate, scarcely constricted, terminal cells hyaline and conical, the inner cells brown, while the entire spore, exclusive of the setae measures 13.3 to 17.66 x 4–5 μ, the colored portion by itself has dimensions of 12–13.33 x 4–5 μ, apical cell crowned with a crest of 3 spreading cilia about 7–10 μ long, lower cell attenuated into a short pedicel. Plate 16, fig. 4. On hickory nuts, Newfield, N. J., May 20, 1893 and May 15, 1894 by J. B. Ellis. We have examined the two collections in the Ellis collection at the New York Botanical Garden and take the one collected May 1893 as the type for it has a description of the fungus in the handwriting of Ellis. The figure was drawn from an original specimen. Saccardo in Syll. Fung., Vol. XI, p. 578 gives the spore dimensions as 12 x 4, but this evidently applies only to the colored part of the spore. This species has also been collected by Roy Latham at Orient, Long Island, N. Y. in 1919.

26. **Pestalozzia nuciseda** sp. nov. Acervuli gregarious, erumpent, black, often shining at the apex; spores broad ellipsoid, 1–3-septate, scarcely constricted at the septa, the first formed septum situated at the middle of the spore, the other two formed later and placed near the extremities, 4-locular, the two middle cells dark brown and often one to two guttulate, terminal cells minute and subhyaline, 12–18 x 7–8 μ, apical cell armed with one to three hyaline, simple or branching cilia about as long as the spores. Plate 16, fig. 5. On nuts and nut shucks of Hicoria, Lyndonville, N. Y., May 1919, C. E. Fairman. *Pestalozzia nucicola* E. & E. is 4-septate, with septa differently situated. *Pestalozzia nuciseda* has broader spores. A comparison of the figures will best reveal the diagnostic features.

TUBERCULARIACEAE.

27. **Tubercularia carpigena** Corda, Ic. Fung. I, p. 4, fig. 64. On horse-chestnuts, lying on the ground, in lawns, Lyndonville, N. Y., July 1920, Fairman. This is the typical form with sporodochia of a more delicate roseate tint than those of T. vulgaris. Provisionally we have referred several Tubercularia-like forms on hickory nuts to this species. Said to be a state of *Nectria Hippocastani* Allesch. The original spelling of the specific name in Corda's Icones is *carpigena,* not *carpogena* as Saccardo has it in Syll. vol. 4.

28. **Volutella ciliata** (A. & S.) Fries. On chestnuts, Europe.

29. **Volutella caryogena** sp. nov. Sporodochia turbinate or turbinate-applanate, pale stramineous, scattered or gregarious, 500 μ or upward in diameter, surrounded by spreading or interwoven white setae which are mostly smooth but at times slightly roughened, obtusely rounded at the tips, double walled, sparingly septate, about 200–500 x 3–7 μ; spores oblong cylindric, straight, obtuse at apices, simple, continuous, hyaline, apparently borne on slender hyaline sporophores. Plate 16, fig. 3, a, b, and c. On nuts and shucks of *Hicoria,* Lyndonville, N. Y., May 18, 1919, Fairman, Wright and Gray. Distinguished by its turbinate form, very long setae, and straight cylindric spores from *Volutella fusarioides* Penz. and *Volutella conorum* E. & E. to the latter of which it seems to come nearest.

30. **Fusarium roseum** Link. On hickory nuts, Lyndonville, N. Y., 1919, Fairman. On cherry pits, Lyndonville, N. Y., JuJly 1920, Fairman. On horse-chestnuts same locality. What appears to be the same thing is found often at Lyndonville, on branches and nuts of black walnut and butternut trees, although the latter may be referable to *Fusarium juglandinum* Peck.

31. **Fusarium nucicola** Karst. & Har. Reported on black walnuts from France and Italy, but we have seen no American specimens.

32. **Epicoccum purpurascens** Ehrenb. On hickory nuts, Lyndonville, N. Y., Oct. 1919, Miss Clara Gray.

HYPHOMYCETEAE.

33. **Cylindrium gossypinum** sp. nov. Clusters effused, very lax or fluffy, elevated in cottony tufts; white; conidiophores not seen or not distinct from the conidia; spores straight cylindric, not attenuated at the ends, often with a minute shining nucleolus at each end, continuous, hyaline, 8.5–12 x 1.5 μ. On the inner walls of a cracked hickory nut, lying on the ground in the woods, Lyndonville, N. Y., Oct. 7, 1919, Wright and Gray.

34. **Penicillium crustaceum** (L.) Fries. Several species of *Penicillium* are universally found on old, musty or decaying nuts, either on the ground or exposed for sale, including the composite form listed under the name above cited. Since the species of this genus can only be satisfactorily differentiated after cultures have been made, studied and compared we are not able to give their names.

35. **Monosporium avellaneum** sp. nov. Clusters scattered in lax, cottony tufts which are pallid white to pale avellaneous in tint; mycelial hyphae decumbent, repent, sparingly septate, hyaline, about 7 μ in width; conidiophores ascending, branched, hyaline, the ultimate branches 3.33–4 μ wide, subobtuse at the ends, bearing 1 or rarely 2 subglobose conidia which are hyaline, 1–3 guttulate, often granular, about 6.66–7 μ in diameter. Plate 19, fig. 5 and 6. On old butternuts, *Juglans cinerea* fruit, Lyndonville, N. Y., July 20, 1920, Charles E. Fairman.

36. **Trichothecium roseum Link.** On a hickory nut and shuck, Lyndonville, N. Y., Oct. 29, 1919, Miss Clara Gray.

37. **Trichothecium candidum** Wallr. On pericarp of black walnut, Italy.

38. **Septocylindrium nuculinum** sp. nov. Spore heaps scattered, minute, subpulvinate, resembling white flecks; spores cylindric, rounded at the ends, often attenuated toward the extremities, single or catenulate, granular at first, becoming 1 to 3 septate, hyaline, 17–25 x 3–4 μ; sporophores invisible. Plate 16, fig. 9. On hickory nut shucks, Ithaca, N. Y., Cornell University Campus, May, 1919, George Hume Smith. Accompanied by a *Vermicularia* and a *Helminthosporium* with the following characters: spores fuliginous, oblong, 9–12-septate, 80–130 x 40 μ, with a long hyaline pedi-

cel at one end, and frequently hyaline cuspidate at the other Plate 16, fig. 10. We await more abundant specimens before giving it a name.

39. **Dactylaria echinophila** Mass. On the spines of the capsules of *Castanea sativa,* Italy.

40. **Coniosporium nucifoedum** sp. nov. Spore heaps rounded, pulvinate or indefinitely effused, black; spores globose or ellipsoid, simple, continuous, dark olivaceous to brown, black or opaque, with a darker rim or cell wall, 6–7 x 3.33–7 μ. On a hickory nut, Lyndonville, N. Y., May 18, 1919, Fairman, Wright and Gray. Plate 16, fig. 7.

41. **Fusella olivacea** (Corda) Sacc. Syll. IV. 246. Lindau, Hyphom. p. 565; Ferraris, Flora Ital. Cryptogama, *Hyphales,* p. 212 and fig. 55. *Fusidium olivaceum* Corda, Icones, I, p. 3. Spore heaps rounded, pulvinate, scattered, black; spores fusoid or ellipsoid, olivaceous, 1–2 guttulate, or at times eguttulate, about 10 x 4 μ. Sporophores absent. Plate 19, figs. 7 and 8. On beechnuts, woods, Lyndonville, N. Y., July 15, 1920, C. E. Fairman. The original description by Corda reads *"Fusidium olivaceum;* Tab. I, fig. 53. acervulis subeffusis olivaceo-atris, decolorantibus, sporis majusculis oblongis utrinque obtusis, olivaceis, semipellucidis." In the descriptions by Saccardo, Corda, Lindau and Ferraris no spore measurements are given. Neither Corda's figure nor the one in Flora Ital. Crypt. show any attempt at nuclear definition.

42. **Acrospeira mirabilis** B. & Br. On chestnuts, England and Italy.

43. **Helicotrichum obscurum** (Cda.) Sacc. Hyphae dark, circinate and denticulate at the lighter colored apices; spores hyaline, oblong or subfusoid and curved, 14–17 x 1 μ. On hickory nuts, Lyndonville, N. Y., Aug. 1919, Miss Clara Gray; on pits of cultivated cherry, Lyndonville, N. Y., July, 1920, C. E. Fairman; on pits of wild cherry, banks of Oak Orchard Creek near Point Breeze, N. Y., Aug. 1, 1920, Miss Clara Gray.

44. **Menispora ciliata** Corda. On a beechnut in the woods, on ground, Lyndonville, N. Y., July 15, 1920, C. E. Fairman.

45. **Bispora monilioides** Corda. On black spots on a hickory nut, Lyndonville, N. Y., May 17, 1919, Dr. L. B. Wright and Miss Clara Gray.

46. **Fusicladium effusum** Wint. On three varieties of cultivated pecans from Jacob's Grove, Orlando, Fla., comm. Dr. C. L. Shear. Causing a serious disease to the pecan grower, which is called pecan scab. It stunts the growth of the nuts and if abundant causes them to drop. A description of the disease may be found in Bulletin 49 of the Georgia State Board of Entomology, p. 38–43 with Plate XIV.

47. **Helminthosporium rhopaloides** Fres. Tufts effused, olivaceous black, resting often on a pale green substratum; conidiophores brown, septate, erect; spores obclavate, 44–67 x 7–10 μ, 7–9 septate and with a nucleus in each cell. Plate 16, fig. 8. The spores are often more attenuate and running to an acute tip than represented in those figured. On hickory nut, Lyndonville, N. Y., May, 1919, Fairman, Wright and Gray. Other *Helminthosporium* species doubtless grow on old nuts but have not been specifically identified.

48. **Sarcinella heterospora** Sacc. On hickory nuts, Lyndonville, N. Y., 1919, C. E. Fairman. Plate 16, fig. 11, a and b. Hyphae aggregated in brown or black felted masses on both the exterior and interior of the nuts, flexous at the tips, about 4 μ wide, roughened, with septa placed 17–27 μ apart, often with abundant clamp connections of the component compartments, bearing dimorphic spores. In our specimens the hyaline falcate, triseptate conidia, measuring 17–24 x 4.5–5 p, are well developed, while the dark colored, sarciniform spores are found in the stage where they have developed from one to two septa, becoming quadrilocular as shown in the illustration. The hyaline spores are smaller than usually stated. Ellis and Everhart, in North Amer. Pyrenomycetes, page 31, say that it is quite common west and southwest "on leaves of *Cornus, Fraxinus* and other trees" but we have seen no previous record of its presence on nuts.

49. **Helicosporium cinereum** Peck. On hickory nut shucks, Lyndonville, N. Y., 1919, Fairman.

50. **Helicosporium olivaceum** Peck. On hickory nuts, Lyndonville, N. Y., Fairman.

PYRENOMYCETEAE.

51. **Microsphaera Alni** (DC.) Wint. In the pecan belt. Causes mildew of pecans.

Schizocapnodium gen. nov. Perithecia situated in or covered by a black mycelial crust, hemispheric, apparently ostiolate, black; asci cylindric, fusoid, or clavate, 4–8 spored, aparaphysate; sporidia ellipsoid or subglobose, concavo-convex or pomiform, cruciform septate, with a single longitudinal and a single tranverse septum at right angles to each other, sometimes with the transverse septum situated lower in one spore half than in the other when the spore halves are not symmetrically approximated, at times with more than one transverse septum, compound and readily splitting longitudinally, at least outside the asci, and dividing into two ellipsoid, uniseptate or biseptate halves, brown or black.

52. **Schizocapnodium sarcinellum** sp. nov. Perithecia scattered or gregarious, aggregated in a black mycelial crust, globose or globose-conoid, base somewhat flattened, slightly roughened, apparently with small, slightly protuding ostiola, dull black, 300 to 500 μ in diameter; asci cylindric or clavate, 55 to 100 μ, or upward, in length by 13.33 to 14 μ in breadth, usually 4-spored, possibly sometimes 6 or 8 spored, readily diffluent; paraphyses indistinct or absent; sporidia uniseriate, broad ellipsoid to subglobose, sides convex, ends slightly concave, i. e. concavo-convex or pomiform, cruciform septate, or with one to two longitudinal septa and one or two transverse septa, sarciniform, sometimes with the transverse septa irregularly situated in case the spore halves are not symmetrically approximated, dividing, at least outside the asci, longitudinally into two ellipsoid, uniseptate or biseptate halves, one half sometimes projecting at the apex of the spore in an acuminate manner, hyaline and 4-magniguttulate at first, becoming brown or black, sometimes nearly opaque with age, 13.33–17 x 10 μ. Plate III, fig. 1, a and b. This interesting fungus was found in the woods of the William Grimes estate at Lyndonville, N. Y., on a single hickory nut, lying on the ground under Hicoria trees by Miss Clara Gray on Oct. 19, 1919. The crust seems to be composed of mycelial threads which are brown, septate, straight or curving, sometimes branching, 6.66 μ in width and at least 100 μ in length. The systematic place of the genus is not clear to the author. Its affinities seem to be with the *Capnodiaceae,* but a study of more abundant specimens may cause it to be placed among the

Sordariaceae, Clypeosphaeriaceae or some other family of the true *Sphaeriaceae.*

53. **Guignardia echinophila** (Schw.) Trav. 1906. Syn. *Sphaeria echinophila* Schw. Syn. fung. Amer. bor. no. 1755, 1831; *Sphaeria echinophila* Ces. Unio. itin. crypt. no. XXI; *Sphaerella echinophila* Awd. Myc. Eur. Heft V–VI, p. 3; *Laestadia echinophila* (Ces.) Sacc. Syll. I, 425 and XI, p. 291, 1882; *Laestadia echinophia* (Schw.) E. & E., N. A. pyr. p. 291, 1892; *Guignardia echinophila* (Schw.) Trav. Flora ital. crypt, Sphaeriales, p. 391, 1906; Exsiccati. Ellis, N. Am. Fungi, 758; Marcucci, Unio itineraria cryptogamia no. XXI, 1866; Icon. Awd. loc. cit. Tab. VII, fig. 103. On chestnut burs, probable wherever chestnuts grown.

54. **Phomatospora phomatospora** (B. & Br.) Schröter. Syn. *Sphaeria phomatospora* B. & Br. *Phomatospora Berkeleyi* Sacc. On pits of cultivated cherries, on the ground under cherry trees, Lyndonville, N. Y., July 20, 1920, C. E. Fairman. Asci straight cylindric, with a prolonged filiform stipe, 50–85 x 3.33–3.50 μ; paraphyses absent; spores fusoid, uniseriate, or overlapping uniseriate, biguttulate, hyaline, 6–7 x 1.5–2 μ. This is a new host for this sp.

55. **Glomerella cingulata** (Stonem.) S. V. & S. On pecan nuts in the pecan belt. Produces the disease called anthracnose, manifested by irregular, black, sunken spots on the affected nuts and causing a heavy dropping of premature nuts.

56. **Chaetomium globosum** Kunze. On nuts of Hicoria sp., Ridgeway, N. Y., May 10, 1919, C. E. Fairman.

57. **Coniochaeta ligniaria** (Grev.) Trav. Rosellinia auct. On hickory nuts, Lyndonville, N. Y., May, 1919, Fairman, Wright and Gray.

58. **Xylaria carpophila** (Pers.) Fr. On hickory nuts, N. Y. State, S. H. Burnham, comm. C. G. Lloyd. What appears to be the *Isaria* or conidial stage of this species was found at Lyndonville, N. Y., on hickory nuts May, 1919, by Fairman, Wright and Gray. Synnema white when fresh turning brown with age, villose; spores globose, hyaline, minute, about 1.5 μ in diam. Plate 20, figs. 1 and 2.

59. **Didymella nucis-hicoriae** sp. nov. Perithecia minute, thickly scattered over the surface, immersed becoming erumpent

and subsuperficial, hemispheric or conic-hemispheric, base sunken in the matrix and leaving a minute depression when picked out, dull black, with polished glistening apices; asci clavate-cylindric, rounded at the apex, sessile or short stipitate, 8-spored, 95 x 10–13 μ; sporidia biseriate, at times uniseriate, fusoid, uniseptate, deeply constricted at the septum, with 4 large guttulae, the upper cell and sometimes the lower one also abruptly enlarging above or below the septum, hyaline, 20–28 x 6–7 μ. Plate 18, fig. 6, a and b. On nuts of *Hicoria* sp. overwintered and lying on the ground in a lawn, under hickory trees, Lyndonville, N. Y., April, 1919, Charles E. Fairman. On hickory nuts, same locality, May, 1919, Dr. L. B. Wright and Miss Clara Gray. Resembles *Didymella fructigena* E. & E. but has larger spores. The specimens collected by Wright and Gray have the perithecia immersed in a discolored area and are accompanied by a brown mucelial growth.

60. **Didymella fructigena** E. & E., N. Am. Pyr. p. 319, 1892. On cherry stones lying on the ground, Newfield, N. J., Ellis.

61. **Melanopsamma abscondita** E. & E. N. A. Pyr. p. 177. On hickory nuts, Newfield, N. J., Sept. 1890, Ellis. On account of the spores becoming triseptate this should be called *Zignoella abscondita* (E. & E.).

62. **Melanopsamma Amphisphaeria carpogena** var. nov. Perithecia globose or globose-conoid, superficial, gregarious or confluent, externally slightly roughened, black, 300 μ in diam.; asci 8-spored, cylindric, sessile or short stipitate, 120–144 x 13.33–18 μ; sporidia uniseriate, elliptical, uniseptate, constricted deeply at the septum, obtuse at the ends, often with one-half broader than the other, granular or with occasional small nuclei, hyaline to subhyaline, 20–24 x 8–10 μ; paraphyses filiform. On hickory nuts, Lyndonville, N. Y., May 18, 1919, Fairman, Wright and Gray. Differs from typical *Melanopsamma Amphisphaeria* Sacc. & Schulz in having slightly roughened perithecia and larger spores. The habitat is also different. Illustration in Flora Ital. Crypt., Sphaeriales, fig. 111, page 682. There are also associated pycnidia filled with bacillar, hyaline spores, 4–6 x 0.5–1 μ, a species of *Aposphaeria*. In Fl. Ital. Crypt. loc. cit. Italian specimens of this species are said to be accompanied by Aposphaeria. Von Höhnel,

sec. Strasser in Annales Mycologici 9:81, refers *M. Amphisphaeria* to *Didymella.*

63. **Melanopsamma subrhombispora** sp. nov. Perithecia scattered, immersed becoming superficial, globose-conoid, base flattened and adnate leaving a small depression surrounded by a small black ring when removed from the nut surface, with minute, shining, papilliform ostiola, slightly roughened externally, black, 100–200 μ in diameter; asci clavate-cylindric, rounded at apex, sessile or short stipitate, surrounded by filiform paraphyses; sporidia irregularly biseriate, fusoid, biconic, acute at apices, with from 2 to 4 small oil-drops, for a long time continuous, probably becoming uniseptate, hyaline, 10–13.33 x 3–3.33 μ. Plate 19, fig. 4. On a beechnut, Lyndonville, N. Y., May 12, 1920, C. E. Fairman.

64. **Endothia parasitica** (Murr.) A. & A. On burs and nuts of chestnut trees, Pennsylvania, J. F. Collins, 1912, and Caroline Rumbold, 1913. This is the chestnut blight, chestnut canker or chestnut bark disease which, according to the above named collectors, has been found on old fruits of chestnut. Its occurrence is discovered from blister like excrescenses on the nuts.

65. **Diaporthe (Tetrastaga) Nucis-Avellanae** Feltgen. Feltg. Vorstud. Pilz. Luxemb. 1901, Nachtr. II, p. 121; Saccardo, Syll. Fung. XVII, 673. On nuts of *Corylus Avellana,* Luxemburg.

66. **Didymosphaeria nuciseda** sp. nov. Perithecia scattered, immersed then erupment, becoming subsuperficial with the base sunk in the matrix up to one-half the height, closely embraced by the remnants of the ruptured sclerenchyma, globose, black, 350–600 μ in diameter; asci cylindric, rounded at the apex, short stipitate, 6–8 spored, 75–85 x 10 μ, surrounded by numerous slender paraphyses; sporidia uniseriate or at times biseriate above and uniseriate below, ellipsoid, uniseptate, when young with a gutta in each cell, not markedly constricted, light brown at first, later becoming dark brown, 11–18 x 6–7 μ. Plate 17, fig. 2. On hickory nuts, Geo. A. Porter farm, Albion, N. Y., May 25, 1919, Miss Lucy Porter and Miss Clara Gray. The spores average 10–14 x 6 μ but spores have been found which measure 18 μ in length. The long spore is often found at the base of the ascus near the stipe while the seven spores above are of normal length.

67. **Rhyncostoma nucis** sp. nov. Perithecia gregarious,

globose or globose-conoid, erumpent-superficial, with tapering, or sometimes abruptly rising, cylindric, bare black beak as long or sometimes longer than the body of the perithecia, black, 500 μ or more in height and 300 μ or more in breadth; asci 8-spored, cylindric, usually long stipitate, 90–130 x 12–13.5 μ, surrounded by slender paraphyses greatly exceeding the asci in length; sporidia fusoid, uniseptate, constricted at the septum, biseriate, or rarely uniseriate, at first hyaline and two to four guttulate, remaining a long time in this condition, gradually becoming pale vinous or light reddish brown, sometimes pale olivaceous, 17–20 x 4.5–6 μ. Plate 17, fig. 4. On a hickory nut overwintered among leaves in a bed of daffodils, Lyndonville, N. Y., April, 1920, C. E. Fairman. Whether the spores become darker or more septate with age cannot be definitely stated. Specimens kept out of doors under similar conditions for a long time showed no marked changes. Not rarely spores are seen with one-half longer and more acute than the other.

68. **Amphisphaeria nucidoma** sp. nov. Perithecia gregarious, rarely scattered, superficial or with the base only slightly sunken in the nut surface, globose, with obtuse protruding ostiola, somewhat roughened, dull black, 500 μ and upward in diameter; asci clavate-cylindric, rounded at the apex, moderately long stipitate, octosporous, 200 x 18 μ, paraphysate; sporidia uniseriate, ellipsoid, uniseptate, constricted at the septum, obtusely rounded at the ends, brown, 24–30 x 13.3–17 μ. Plate 17, fig. 3. On a hickory nut, Lyndonville, N. Y., 1919, C. E. Fairman.

69. **Zignoella nucivora** sp. nov. Perithecia gregarious, rarely scattered, globose or globose-conoid, sometimes collapsing, externally slightly roughened, immersed at first then becoming superficial, dull black, with shining papilliform ostiola, 300–350 μ in diam.; asci clavate-cylindric, octosporous, short stipitate, 80–100 x 8–10 μ, paraphysate, sporidia irregularly biseriate, fusoid or ellipsoid, attenuated and subacute at the ends, at times inequilateral, tri-septate, not constricted at the septa, hyaline or subhyaline, often 4-guttulate, 17–24 x 5–7 μ. Plate 17, fig. 9. On hickory nuts, George A. Porter farm, Albion, N. Y., May 20, 1919. Dr. Leon B. Wright, Miss Lucy Porter and Miss Clara Gray. Another collection was made at same locality by Miss Porter in June, 1919.

70. **Herpotrichia macrotricha** (B. & Br.) Sacc. Syll. 2:213. On nuts of *Fagus,* Germany, see Lindau in Hilfsbuch.

71. **Rhynchosphaeria nucicola** sp. nov. Perithecia scattered, globose, base slightly sunk in the matrix, with prominent, prolonged, cylindric, beak-like ostiola, black, 500 μ and upward in diam.; asci cylindric or clavate, 8-spored, short stipitate, rounded at the apex, 110–117 x 13–14 μ, paraphysate; sporidia biseriate, fusoid, straight or curved, 5–7 septate, constricted at the septa, each loculus often guttulate, middle cells larger, sometimes with one of the middle cells enlarged, 30–37 x 7–8 μ. Plate 17, fig. 8, a, b. and c. Sparingly found on a hickory nut on the banks of Johnson Creek, Blood's Bridge, Yates, Orleans Co., N. Y. by Charles E. Fairman and Miss Helena A. Phelps, May 13, 1919. Also on a beechnut, in the woods, Lyndonville, N. Y., June, 1920, C. E. Fairman. The spores bear some resemblance to those of *Melanomma hydrophilum* Karst. sec. Berlese, Icones Fungorum, Tab. XXIV, f, 4, but the perithecia seem different.

72. **Leptosphaeria exocarpogena** sp. nov. Perithecia thickly scattered, immersed then erumpent, becoming subsuperficial, globose, centrally ostiolate, black, 200–250 μ in diam.; asci cylindric, 8-spored, 78–93 x 7–8 μ, paraphysate; sporidia biseriate, oblong-fusoid to biconic, triseptate, constricted at the middle septum, but not markedly at any of the other septa, hyaline, then becoming yellow or brown, 23–27 x 3–4 μ. Plate 17, fig. 5, and Plate IV, fig. 1. On a shuck of hickory nut, under *Hicoria* trees, flats along Johnson Creek, Gambell farm, Lyndonville, N. Y., May 1, 1919, C. E. Fairman. When the spores are biconic they resemble those of *Leptosphaeria Parietariae* Sacc. as figured by Berlease in Ic. Fung. Tab. XLVI, f. 2.

73. **Leptosphaeria cacuminispora** sp. nov. Perithecia scattered or gregarious, immersed at first, becoming erumpent, often imbedded in débris on the surface of the nut, covered at times, except at the apex, with a brownish tomentum, globose or globose cenoid, papilliform ostiolate, black, 200–250 μ in diam.; asci clavate-cylindric, octosporous, straight or curved, long and narrow, about 90–135 x 6–10 μ, thickly interwoven and separable with difficulty, surrounded by filiform paraphyses which are at times enlarged at apices and usually exceed the asci in length; spores overlapping

uniseriate, sometimes biseriate, fusoid, 3–7–septate, constricted at the middle septum, one or two of the middle cells often globose enlarged, end cells longer and very sharp pointed or acute, pale brown or yellowish brown, 27–30 x 3–5–4 μ. Plate 17, fig. 7. On hickory nuts, Lyndonville, N. Y., Apr. 1919, C. E. Fairman. Distinguished by its long, narrow asci, and acute spores.

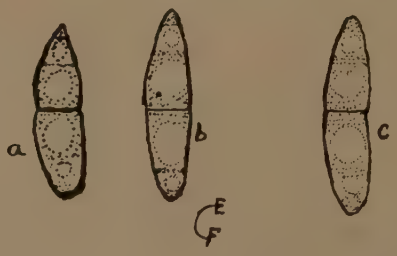
74. **Leptosphaeria Lyndonvillae** Fairman. Plate 17, fig. 6. On hickory nuts, Lyndonville, N. Y., 1919, C. E. Fairman. Originally found on old locust pods. For a discussion of the species consult Fairman, Pyrenomyceteae novae in leguminibus Robiniae, Annales Mycol. vol. IV, p. 327 and fig. 1, 1906.

75. **Caryospora putaminum** (Schw.) De Not. Plate 19, fig. 3. *Sphaeria putaminum,* Schw. Syn. Fung. Carolinae superioris,, in Schr. Nat. Ges., Leipzig, 1822, p. 43, no. 163. Fries. Syst. Mycol. vol. 2, p. 461–462, Tribe XX, Pertusae, 1822. De Notaris, Micr. Ital., Dec. IX, 1855. Saccardo, Fungi Veneti, Series III, p. 8 and Syll. Fung. 2: 122. Berlese, Icones Fungorum, p. 26. Ellis and Everhart, North Amer. Pyrenomycetes, p. 209. Illustrations: Saccardo, Fungi Italici, tab. 201. Berlese, Icones Fung. tab. XVI, fig. 1. Ellis and Everhart, N. Am. Pyr. plate 24. Underwood, Moulds, Mildews, etc., plate IV, fig. 15; Cooke, Fungi, etc., Internat. Sc. Ser., fig. 78 (spore x 400). Icon. nostr., plate 19, fig. 3, and Plate 20, fig. 4. Exsiccatum: Ellis, N. A. F. no. 898. Habitat. On peach pits, common in the peach region. On hickory nuts, Starksville, Miss., J. S. Moore, 1895 and S. M. Tracy, 1896. On hickory nut shell, Scottsburg, Indiana, J. R. Weir, no. 5196, Nov. 12, 1917, in the herbarium of Prof. H. M. Fitzpatrick, labelled *Caryospora minor* Peck. The Indiana specimens have evidently been misdetermined for the perithecia and spores are like those of Caryospora putaminum. This species, the most memorable of all the nut fungi, has an interesting history. Originally collected by Schweinitz in North Carolina and published by him as Sphaeria putaminum, it was soon included by Fries in Syst. Mycol. in the section Pertusae. Neither Schweinitz nor Fries seem to have made any microscopic examination of it, for they do not record any spore measurements or characters. Schweinitz was evidently impredded with the gross appearance of the fungus for he mentions its large size, ampulliform neck with dilated apex, and other fea-

tures. De Notaris, having received a small specimen of it from Berkeley, compared it with his Sphaeria nucleria on olive pits and decided that the species of Schweinitz belonged to a new genus which he called Caryospora. De Notaris could not find asci and concluded that the spores originated directly from the applanate base. To De Notaris, however, belongs the credit of first observing the microscopic spore characters. Saccardo collected the ascigerous form on a decaying peach pit at Padua, Italy. He described the asci and spores in Fungi Veneit, loc. cit. In Sylloge Fungorum, vol. 2 Saccardo emended the genus Caryospora and placed it among the Pyrenomycetes.

76. **Caryospora minor** Peck. Peck, 44th Rep. N. Y. State Mus. p. 29 and plate 4, figs. 18–21, 1891.

On pericarp of hickory nuts, Albany, N. Y., Peck. Through the kindness of Dr. Homer D. House, State Botanist, we have had the privilege of examining the type specimens and have illustrated the species in plate 19, fig. 1, and plate 20, fig. 3. We have also examined a portion of the type in the herbarium of Prof. H. M. Fitzpatrick of Cornell University. The spores were originally described by Dr. Peck as "fusiform, pointed at each end, uniseptate and slightly colored." Spores stained in a solution of equal parts of glycerine and camphor water tinged with erythrosine show that they became 3–5 pseudoseptate and sometimes slightly constricted at the middle septum. The end of the stained spores and each side of the septa are filled with erythrosinophile granules, while the interior of the loculi is occupied by globose, hyaline nuclear bodies.



Figs. a, b and c. Spores of *Caryospora minor* Pk., stained with erythrosine.

The paraphyses, of which no mention is made in the original

description, are filiform, exceeding the asci in length and not readily seen except in stained specimens. The specimens at hand are perhaps not mature judging from the pale color of the spores and their pseudoseptate appearance when stained. It may prove to be a *Melanomma* or *Trematosphaeria*. The spores lack the true snout-like prolongation of *Caryospora* spores, and do not seem to be involved in mucus.

77. **Melanomma caryophagum** (Schw.) Syn.

Sphaeria caryophaga Schw. Syn. Amer. bor. n. 1594. Trans. Amer. Phil. Soc., 2, p. 215. Sacc. Syll. vol. 2, no. 4332.

Sphaeria nuclearia De Not. Micr. Ital. Decade IX, no. 4, fig. 4, 1855. Auct. Amer. p. p.

Sphaeria Curtisii, Berk. Curtis, Cat. p. 145. Nomen nudum.

Sphaeria caryophaga Schw. in Berkeley, Notices of North Amer. Fungi, 1872 et seq. p. 185. On Carya, Carol. inf. no. 6032.

Hypoxylon nucitena B. & C., Berkeley, Not. North Am. Fungi, no. 844, Grevillea, Sept. 1875, p. 52.

Melanomma nucitena (B. & C.) Sacc. Syll. 2: 103, 1883.

Caryospora nuclearia (De Not.) Thuemen.

Trematosphaeria nuclearia (De Not.) Sacc. Syll. 2: 121, 1883.

Trematosphaeria nuclearia (De Not.) E. & E., N. Am. Pyr. p. 207, 1892.

Trematosphaeria caryophaga (Schw.) Sacc. Syll. IX, 813, 1891.

Melanomma nuclearium (De Not.) Berl. Ic. Fung. p. 35, 1891.

Melanomma Minervae Fabre, Sph. Vaucl., p. 91, f. 26, fide Berlese, loc. cit.

Illustr. Berlese, Icones Fung. tab. XXIII, figs. 2 and 3, p. p. Habitat: On nuts of *Carya alba* and *tomentosa,* Bethlehem, Pa., Schweinitz; on nuts of *Hicoria,* North Carolina, Curtis; on same host from following localities: Pennsylvania, Dr. Michener; Orient, N. Y., Roy Latham; Kittery Point, Maine, Sept. 1919, Prof. Rol-

and Thaxter; High banks of the Genesee River, near Mount Morris, N. Y., July 11, 1920, Miss Clara Gray; Pennsylvania, Everhart; also specimens in the Ellis Collection at the N. Y. Botanical Garden from Pa. and Mo., date and locality not given.

We have not accepted the genus *Trematosphaeria* as distinct from *Melanomma*. The basing of a genus upon size and pertusate apex seems insufficient. The latter character is often a condition of age and consequent deciduousness of the neck or ostiolum. This species on hickory nuts has been called in recent years *Trematosphaeria nuclearia* (De Not.) and has been supposed to be identical with a fungus found in Europe on olive pits. The different habitat renders this supposition open to doubt. Plate 18, fig. 5 was drawn from a specimen on olive pits from Liguria, taken from Erb. Critt. Ital. Series II, labelled *Melanomma nuclearium*. On the olive the the perithecia are generally scattered, sometimes gregarious, and we have never seen them crustose-aggregated. Plate 18, fig. 4 shows the appearance of the *Melanomma* on hickory nuts collected at Mount Morris, N. Y. Specimens from Prof. Thaxter, collected at Kittery Point, Maine, have the perithecia so close that an almost continuous crust results. If Berkeley had similar forms before him it need excite no surprise that he should have named it *Hypoxylon nucitena*. Again, the spores of the species in question, upon our hickory nuts, seem to be smaller than those on the olive pits, as a reference to Plate 17, will show. Fig. 11 represents the spores from the specimens in Erb. Critt. Ital., while fig. 10a shows the spores of specimens from Kittery Point, Me. and 10b slightly larger ones from Mt. Morris, the two last being on hickory nuts. Basing our opinion upon different habitat, dissimilar appearance of perithecia upon the hosts and smaller, though similar, spores we think that the specimens of *Melanomma* upon our American hickory nuts are referable to a distinct species. In regard to the specific name chosen we have the following to offer. The original description of Schweinitz, loc. cit., seems to fit the species under discussion. It reads "S. gregaria, regularis, mediocri magnitudine, plagas formans aterrimas subexpansas in nucibus; peritheciis dimidiatis ex hemisphaerico subconicis, basi crusta nigra, inter se connexis tenui, papillatis, demum pertusis." We have not been able to examine the specimens of Schweinitz, Curtis, or Michener. Dr.

C. L. Shear, who has been engaged in examining the Sphaerias of the Schweinitz herbarium writes as follows: "I regret to say that in our studies of the fungi in the Schweinitz herbarium we have not yet reached Sphaeria caryophaga and I am not sure at present whether his collection contains a specimen of this species. Some of the species are missing. The opinion of Cooke in regard to the identity of this species was probably based upon authentic specimens which are found in the Kew herbarium and may perhaps be correct, unless as is sometimes the case, Schweinitz included more than one species in his collection." At present the best that the writer can do is to accept the uncorroborated statement of Cooke in Grevillea, XVIII, p. 60, March 1890. He says loc. cit. "from authentic specimens of Schweinitz, Berkeley and Curtis, and the figure and description of De Notaris we are satisfied that the above are all one species." The specific name *caryophaga* antedates that of *nuclearia,* by De Notaris.

78. **Sporormia leptosphaerioides** Speg. Syn. *Sporormia leporina var. Pruni spinosae* Kunze, Fungi sel. exsicc. no. 273. On hickory nuts, May 1919, and on a nut of black walnut, June 1920, Lyndonville, N. Y., Fairman. Berlese says that this is found in Germany on cherry pits. Plate 19, fig. 9. In the specimen on black walnut the perithecia are globose, papillate, black, 250 μ in diam.; Asci clavate-cylindric, short stipitate, 8-spored, 100 x 13.5–17 μ; spores fusoid, quadrilocular, brown, 33–35 x 6–7 μ, terminal cells conical, inner cells subglobose.

79. **Teichospora nucis** E. & E., Proc. Acad. Nat. Science, Philad. 1893, p. 446. Sacc. Syll. Fung. 11:345. On old nuts of *Hicoria,* Newfield, N. J., Ellis. Plate 18, f. 2 drawn from an original specimen in the Ellis collection.

80. **Nectria Hippocastani** Allesch. Suedbay. Pilz. p. 160, t. 1, f. 2. Sacc. Syll. IX, 961–962. On fruit of *Aesculus* near Munich, Bavaria. What appears to be the *Tubercularia* stage of this has been found at Lyndonville by the author.

81. **Gibberella saubinetii** (Mont.) Sacc. On a hickory nut in a lawn, underneath a hickory tree, Lyndonville, N. Y., May 7, 1919, C. E. Fairman.

82. **Glonium caryigenum** E. & E., N. Am. Pyr. p. 682. On

old nuts of *Hicoria,* Newfield, N. J., Ellis. Plate 18, fig. 3, from an original specimen in the Ellis collection.

83. **Lophiosphaera pulveracea** Sacc. On a hickory nut lying on the ground among leaves in the author's rose garden, Lyndonville, N. Y., June 6, 1920. Perithecia with compressed ostiola; asci clavate, 50–100 x 6–7 μ, surrounded by filiform paraphyses exceeding the asci in length; sporidia fusoid, hyaline, uniseptate, constricted at the septum, acute at the ends, with a minute hyaline apiculus at each end, 2–4 small guttulate, hyaline, 17 x 3–4 μ.

84. **Lophiotrema crenatum** (Pers.) Sacc. On decaying walnut shucks, Germany. Rehm, Ann. Mycol. 9: 58.

Doubtful or Excluded Pyrenomycetes.

Dothidea missourienis Schw.

Dr. C. L. Shear sends the following information relative to this species: "In regard to the other fungus, Dothidea missouriensis, I have examined a specimen of this so labelled by Schweinitz, it being a part of Schweinitz's original collection found in the herbarium of Michener. Ellis says in his North American Pyrenomycetes, that the specimen in Schweinitz's herbarium which he examined is a thin sterile crust. This describes fairly well the syecimen I have examined. The so-called sterile crust, however, is only a blackening of the tissue of the host, that is, the outer layer of the inner shell of the pecan, which is the host. There are a few fungus filaments intermingled with this dark colored layer and these filaments may belong to Fusicladium effusum Winter which is very common on pecan nuts in the South. Schweinitz's name, however, must I think be regarded as a nomen nudum, as there is no fungus present in condition for examination." Also placed in *Species Phyllachorae delendae* by Theissen and Sydow in their monograph, *Die Dothideales,* page 574.

Hysterographium nucicolum (Schw.) E. & E.

Hysterium nucicolum Schw. We have not been able to examine a specimen of this and Dr. F. J. Seaver, Curator, N. Y. Botanical Garden informs me that he has been unable to find a specimen in the Ellis collection.

DISCOMYCETEAE.

85. **Ciboria echinophila** (Bull.) Sacc. On involucres of chestnuts, Bethlehem, Pa., Schweinitz. Prof. E. J. Durand, Bull. Torr. Cl., July 1902, thinks that this may have belonged to *Ciboria Americana,* which is probably the American representative of the European *C. echinophila.*

86. **Ciboria Americana** Durand. Durand, Studies in North American Discompcetes, Bull. Torr. Bot. Cl., July 1902, p. 461–462. On chestnut burs, Ithaca, N. Y., Oct. 16, 1901. We have examined a specimen in our herbarium from E. J. Durand, North American Discomycetes, no. 1189.

87. **Ciboria Juglandis** Preuss. On hickory nut shucks, Ithaca, N. Y., July 14, 1903. Durand's N. Am. Disc. no. 2279, in my herbarium, is probably this species.

88. **Ciboria nyssogena** (Ellis) Sacc. On old nuts of *Nyssa multiflora,* New Jersey, Ellis.

89. **Phialea fructigena** (Pers.) Gill. On hickory nuts, Lyndonville, N. Y., May to Nov. Common where hickory nuts are found. Found also on beech-nuts, chestnut capsules, and oak acorns.

90. **Helotium humile** Sacc., Mich. 2:78, & Syll. 8:242. Fairman, Fungi Lyndonvillenses novi vel minus cogniti, Ann. Mycol. 8:330, no. 37. On capsules of horsechestnut in Normandy, France. On same host, Lyndonville, N. Y., Nov. 1909, C. E. Fairman.

91. **Helotium herbarum** (Pers.) Fr. On hickory nut shucks, Lyndonville, N. Y., Nov. 1919.

92. **Karschia elaeospora** sp. nov. Apothecia scattered, globose then expanded, finally applanate, sessile, black, margin upturned, 200–650 p in diameter; asci clavate-cylindric, short stipitate, 6–8 spored, surrounded by interwoven paraphyses, 50 x 5–6 μ; sporidia conglobate or biseriate, ellipsoid, uniseptate, one to two guttulae in each half, slightly constricted at the middle, sometimes unconstricted, at first exhibiting a greenish or smoky tint, becoming pale olivaceous, 10–13.3 x 3.5–4 p, iodine reaction positive. On the inner partition walls of a cracked hickory nut, Albion, N. Y., George A. Porter farm, May 25, 1919, Dr. Leon Wright, Miss

Lucy Porter and Miss Clara Gray coll. Also found on the outside of a hickory nut at Lyndonville, N. Y., May 25, 1919, Fairman, Wright and Gray. In the Lyndonville specimens the spores are often inequilateral, with one cell having a more acute end than the other, somewhat resembling a human footprint. The specimens collected at these localities, about 16 miles apart, agree in the olivaceous spores. Plate 18, fig. 7 shows the spores as they usually appear.

EXTRALIMITAL DISCOMYCETEAE.

The following species have been found in Europe and some of them being cosmoplitan may be looked for on our nuts and pits.

On nuts and involucres of *Fagus* sp.

93. **Helotium carpinicola** Rehm.
94. **Pezizella conorum** Rehm.
95. **Lachnum virgineum** (Batsch.)
96. **Arachnopeziza aurelia** (Pers.)

On nuts and involucres of *Aesculus*

97. **Phialea tetraspora** Feltg.
98. **Cyathicula coronata** (Bull.)
99. **Cyathicula fructigena** Feltg.

MYXOMYCETEAE.

100. **Arcyria globosa** Schw. Common on fallen chestnut burs. *Lachnobolus g.*, F. Col. 1100.

MUCORACEAE.

The following **Mucoraceae** have been reported on nuts but the writer has not seen them. They must be considered doubtful.

Mucor echinophilus Schweinitz, Syn. of North Amer. Fungi no. 2742. Reported from Pennsylvania on spines of the involucres

of chestnuts. Prof. Sumstine (N. Amer. Mucorales, Mycologia, 2: 152) reports that the original specimens are all gone and that its identity is uncertain.

Mucor Juglandis, Link, Obs. I, p. 18. On rancid nuts of *Juglans regia* in Germany and Belgium. This species also lacks confirmation.

Addendum.

101. **Stachylidium** sp. Acervuli fluffy, mouse colored to dark cinereous; hyphae brown, sparingly septate, verticillately branched; sporiferous branches acute at apices, gradually enlarging toward the base which is often enlarged or dilated and transversely septate, hyaline when young becoming almost as dark as the hyphae with age, branches 3 to 5, crowned with a globose head of agglutinated ellipsoid or subglobose spores which are hyaline, often minutely granular and measure about 3.33–5 x 1.5–3 μ. On pericarp of butternut, *Juglans cinera,* Lyndonville, N. Y., Sept. 19, 1920, Miss Clara Gray. Comes near *S. chartarum* and we are calling it, in the herbarium, *Stachylidium murinotinctum* sp. nov. ad int.

Note.—In Farlow's Bibliographical Index to North American Fungi, vol. 1, part 1, p. 214 *Amphisphaeria caryophaga* Cooke is given as a synonym of *Melanomma caryophaga,* and on page 218, loc. cit. *Amphisphaeria putaminum* Cke is listed as a syn. of *Caryospora putaminum* Schw. We have not been able to see Cooke's paper. *Sphaeria druparum* Schw. on black walnuts is doubtful.

102. **Bertia fructicola** P. Henn. Reported by Prof. A. P. Morgan in Journal of Mycology, 10: 226, as found at Preston, Ohio, growing on old nuts of *Juglans regia.* We have not seen Morgan's specimens and have no personal knowledge of Henning's species. Therefore we can not say whether any of the *Didymellas* or *Melanopsammas* described in this paper are the same or not. Cfr. loc. cit. for Morgan's description.

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Explanation of Plates.

PLATE 15.

Fig. 1. *Aposphaeria nucicola* E. & E., spores.
Fig. 2. *Aposphaeria allantella* Sacc., spores.
Fig. 3. *Rhabdospora baculum* Grove, spores.
Fig. 4. *Macrophoma Fitzpatriciana,* spores.
Fig. 5. *Rhabdospora baculum nucimaculans,* spores.
Fig. 6. *Phoma exocarpina* Peck, spores.
Fig. 7. *Pyrenochaeta nucinata;* a, spores; b, pycnidial bristles.
Fig. 8. *Sphaeropsis pericarpii* (Schw.) E. & E., spores.
Fig. 9. *Dothiorella nucis,* spores.
Fig. 10. *Vermicularia Dematium,* spores.
Fig. 11. *Diplodina epicarya,* spores.
Fig. 12. *Stagonospora nuciseda,* spores.

PLATE 16.

Fig. 1. *Hendersonia pustulata* E. & E., spores.
Fig. 2. *Discosia artocreas* (Tode) Fr., spores.
Fig. 3. *Volutella caryogena;* a, sporodochium; b, spores; c, tips of two setae.
Fig. 4. *Pestalozzia nucicola,* E. & E., spores.
Fig. 5. *Pestalozzia nuciseda,* spores, two of them attached to sporophores or pedicels.
Fig. 6. *Sphaeropsis pallidula,* spores.
Fig. 7. *Coniosporium nucifoedum,* a group of spores.
Fig. 8. *Helminthosporium rhopaloides,* spores.
Fig. 9. *Septocylindrium nuculinum,* spores.
Fig. 10. *Helminthosporium*-like fungus associated with *Septocylindrium.*
Fig. 11. *Sarcinella heterospora* Sacc.; a, hypha and spores; b, spores.

PLATE 17.

Fig. 1. *Schizocapnodium sarcinellum;* a, spores; b, a 4-spored ascus and spores.
Fig. 2. *Didymosphaeria nuciseda,* spores.
Fig. 3. *Amphisphaeria nucidoma,* spores.
Fig. 4. *Rhyncostoma nucis,* spores.
Fig. 5. *Leptosphaeria exocarpogena,* spores.
Fig. 6. *Leptosphaeria Lyndonvillae,* spores.
Fig. 7. *Leptosphaeria cacuminispora,* spores.
Fig. 8. *Rhynchosphaeria nucicola,* spores; a, on hickory nut; b, on beech-nut; c, a rostrate perithecium not drawn to scale.
Fig. 9. *Zignoella nucivora,* spores.
Fig. 10. *Melanomma caryophaga,* spores; a, from Kittery Point, Me. specimen; b, from Mt. Morris, N. Y. specimen.
Fig. 11. *Melanomma nuclearium* from Erb. Critt. Ital., spores.
Fig. 12. *Stagonospora nucicidia,* spores.

PLATE 18.

Fig. 1. Shuck of hickory nut with perithecia of *Leptosphaeria exocarpogena.*
Fig. 2. *Teichospora nucis* E. & E., spores.
Fig. 3. *Glonium caryigenum* E. & E., spores.
Fig. 4. Perithecia of *Melanomma caryophaga* on hickory nut from Mt. Morris, N. Y.
Fig. 5. Perithecia of *Melanomma nuclearium* on olive pit from Erb. Critt. Ital.
Fig. 6. *Didymella nucis-hicoriae;* a, an ascus and paraphysis; b, spores.
Fig. 7. *Karschia elaeospora,* spores.
Fig. 8. A portion of a hickory nut with *Phialea fructigena.* In this plate figures 1, 4, 5, and 8 are not drawn to scale.

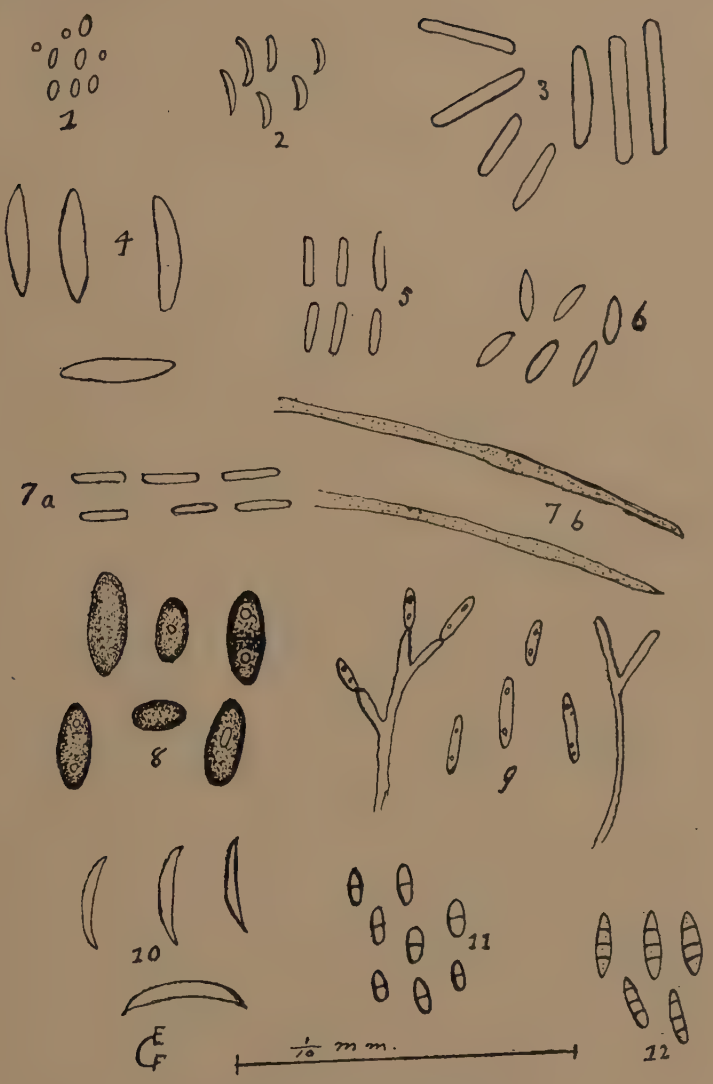
PLATE 19.

Fig. 1. *Caryospora minor* Peck; a, usual type of spore; b and c, spore forms sometimes seen.
Fig. 2. An ascus of *Caryospora minor,* not drawn to the same scale as the spores.
Fig. 3. *Caryospora putaminum* (Schw.) De Not., spore.
Fig. 4. *Melanopsamma subrhombispora,* ascus and spores.
Fig. 5. *Monosporium avellaneum,* conidiophores.
Fig. 6. Spores of *Monosporium avellaneum.*
Fig. 7. *Fusella olivacea* (Corda), spores.
Fig. 8. A part of a beechnut with spore heaps of *Fusella.*
Fig. 9. Spores of *Sporormia* sp. on hickory nuts.

PLATE 20.

Photographed by Irving E. Sill, Lyndonville, N. Y.

Fig. 1. *Xylaria carpophila* on a hickory nut, collected by S. H. Burnham in N. Y. State. Comm. C. G. Lloyd.
Fig. 2. *Isaria* stage of *Xylaria carpophila,* specimen collected at Lyndonville, N. Y. a, the apex; b, the base.
Fig. 3. *Caryospora minor* Peck. From the type specimen on hickory nut, collected by Dr. C. H. Peck.
Fig. 4. *Caryospora putaminum* on hickory nut, collected by Mr. J. S. Moore at Starksville, Miss.



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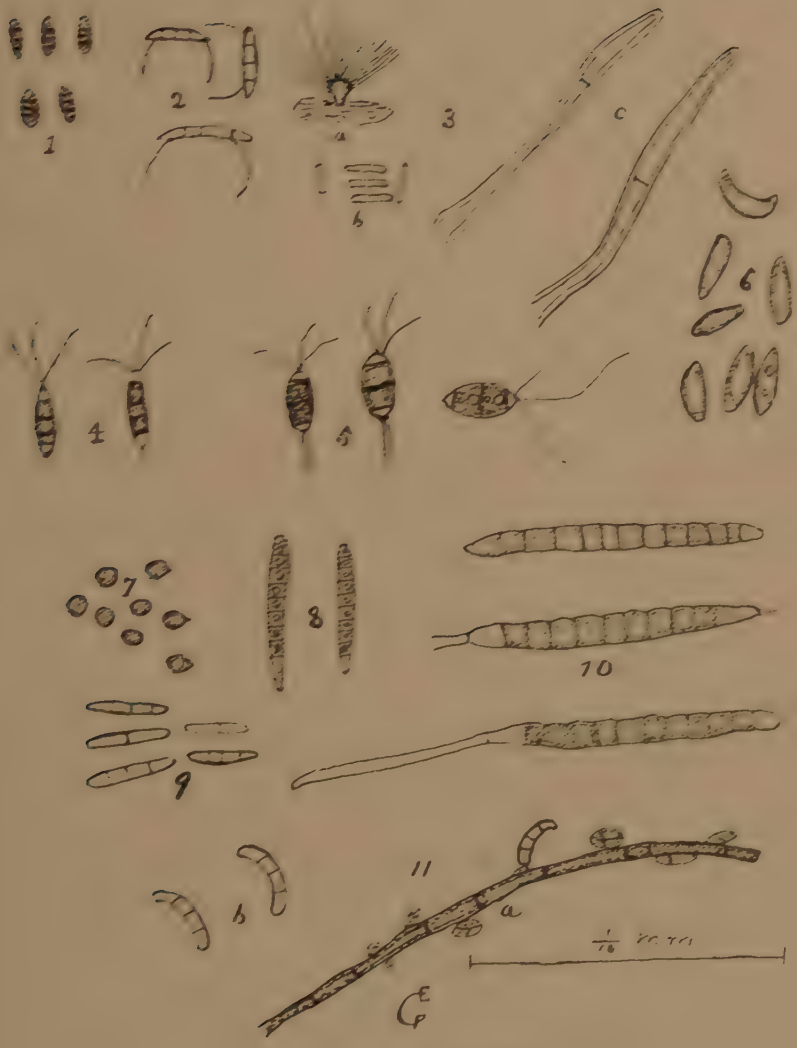

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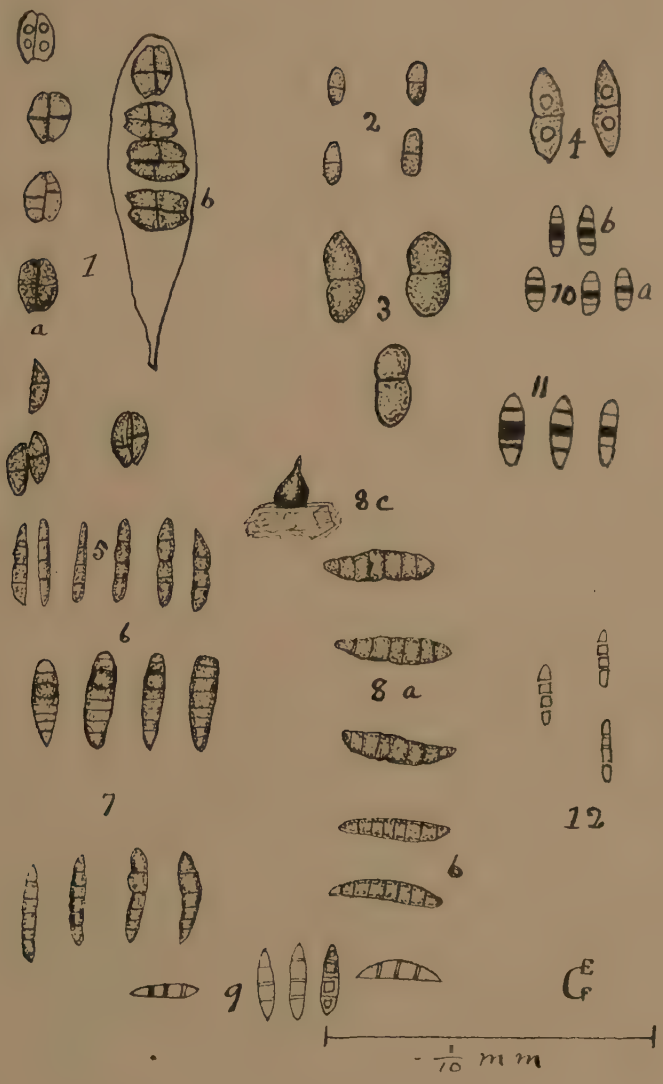

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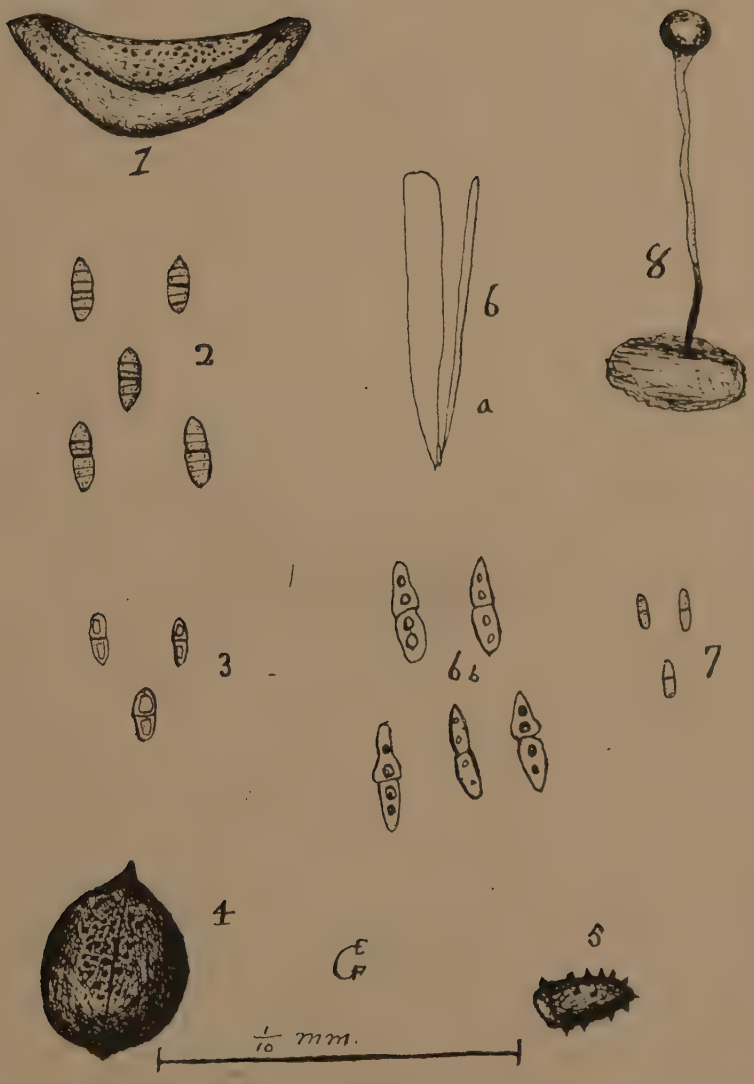

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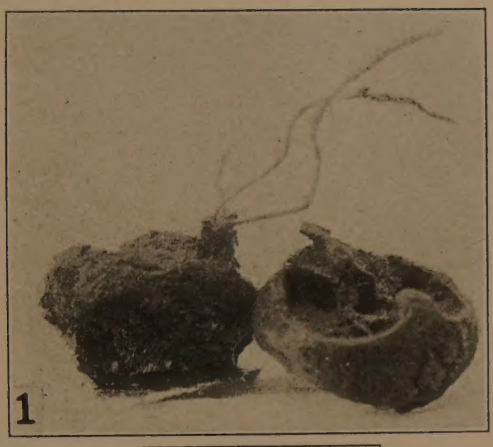

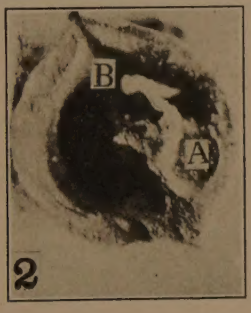

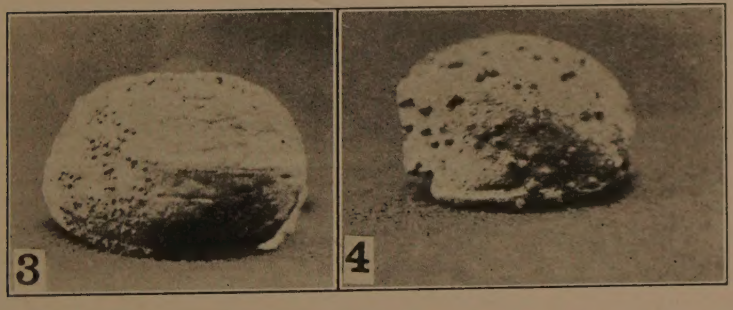

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